

FLUORESCENT HANGING LIGHT FIXTURE

0001 This application under 37 CFR 1.53 (b,2) is a continuation-in-part of ser. no. 09/870,976, filed 06/01/2001, for FLUORESCENT HANGING LIGHT FIXTURE, ^{now U.S. Patent No. 6,585,396} having the same inventor.

BACKGROUND OF THE INVENTION

0002 Fluorescent hanging light fixtures, up to the present have a shroud fastened to the ceiling, or are mounted in recessed openings in the ceiling, and the ballast is mounted in the concave side of the shroud. This present invention discloses a hangable fluorescent light fixture with elongated fluorescent light tubes, mounted on the concave side of elongated reflectors and the elongated reflectors attached to socket mount/wire raceway arms of the fluorescent light fixture frame.

SUMMARY OF THE INVENTION

0003 Disclosure is made of a fluorescent light fixture 1, having elongated light reflectors 4, and each end of the light reflectors 4, attached to socket mount/wire raceway arms 6, attached to ends of ballast channel assembly 2, and sockets 5, for elongated fluorescent light tubes 3 mounted on socket mount/wire raceway arms 6 at each end of the elongated light reflectors 4 on the concave side, and elongated fluorescent light tubes 3, inserted into fluorescent light tube sockets 5 on the concave side 4'' of the elongated light reflectors 4, and the elongated light reflectors 4 having a parabolic shape in cross section, to control down light

0004 In the following specification and claims the terms

"light reflectors" and "fluorescent light tubes" includes "elongated light reflectors" and "elongated fluorescent light tubes", identified as linear fluorescent bi-pin tubes.

0005 An object of this invention of a fluorescent light fixture assembly 1 including a fluorescent light fixture frame 12 a ballast channel assembly 2 and socket mount/wire raceway arms 6, attached to the ballast channel assembly 2 and fluorescent light reflectors 4, attached to the socket mount/wire raceway arms 6, and fluorescent fixture tube shunted sockets 5, 5' attached to the socket mount/wire raceway arms 6, and the fluorescent fixture tube sockets 5, 5' located under each end of the fluorescent light reflectors 4, and fluorescent dual pin light tubes 3, inserted into the fluorescent fixture tube shunted sockets 5, 5' under the reflectors 4, and an electric power source 7 into the light fixture assembly and a switch on/off 20 mounted on the ballast channel assembly, and the power connected to the ballast 23 components mounted in the ballast channel assembly 2.

0006 Another object is to disclose elongated fluorescent light reflectors of new geometry and assembly to better reflect elongated fluorescent tube light downward.

0007 Another object is to disclose a fluorescent light tube assembly having a plurality of eight elongated fluorescent light tubes aligned parallel side by side in an assembled fluorescent light fixture, and an elongated reflector over each of the elongated fluorescent tube lights, and only one ballast for a total plurality of at least two to eight elongated fluorescent light tubes in the light fixture.

0008- Another object of this invention is to disclose rim edges, bent outwards, on edges of elongated light reflectors having a cross section of a modified inverted U.

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PRIOR ART

The following U.S. Patents are cited as prior art.

2,619,583 to BAUMGARTNER for LUMINAIRE FOR ELONGATED

LAMPS. This patent discloses a housing over the back of the reflectors.

3,247,368 to MCHUGH for FLUORESCENT LIGHTING FIXTURE.

This discloses the lights grouped under a hood and does not include individual reflectors.

4,674,015 to SMITH for FLUORESCENT LIGHT FIXTURE WITH

REMOVABLE BALLAST. Disclosure is made of a plug in ballast on the spine of the fixture.

4,814,954 to SPITZ for RIGID LIGHTWEIGHT FLUORESCENT

FIXTURE. Disclosure is made of a reflector positioned between double walled end panels, which are connected to one another by a double walled elongated box like structure.

4,928,209 to RODIN for LIGHTING APPARATUS. This patent

discloses a reflector, having tube hangers one reflector for each pair of tubes, and the reflectors mounted in a cover.

5,062,030 to FIGUEROA for CUSTOMIZED LIGHT REFLECTOR.

This patent discloses reflectors mounted in existing fixtures.

5,192,129 to FIGUEROA for CUSTOMIZED LIGHT REFLECTOR.

This patent discloses light reflecting planes installed in a lighting fixture.

0010- BRIEF DESCRIPTIONS OF DRAWINGS

- Fig. 1 - Top plan view.
- Fig. 2 - Cross section of fixture.
- Fig. 3 - End elevation view.
- Fig. 4 - Front elevation view.
- Fig. 5 - Perspective view.
- Fig. 6 - Bottom plan view.
- Fig. 7 - Perspective view of fluorescent light fixture assembly.
- Fig. 8 - Fluorescent light fixture frame.
- Fig. 9 - Perspective view of fluorescent light reflectors.
- Fig. 10 - Wiring diagram of fluorescent light fixture frame.
- Fig. 11 - Cross section of ballast channel.
- Fig. 12 - Cross section of socket mount arm wire raceway
- Fig. 13 - Reflector segments with slots.
- Fig. 14 - Cross section of single reflector fixture.
- Fig. 15 - Perspective view of single reflector light fixture assembly.
- Fig. 16 - Cross section view of geometry of fluorescent tube light reflector.
- Fig. 17 - Cross section view of alternate geometry of fluorescent tube light reflector.
- Fig. 18 - Magnified cross section exploded view of fluorescent reflectors before assembly.
- Fig. 19 - Magnified cross section view of fluorescent reflectors adjoining on being assembled in light fixture.

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LEGENDS OF DRAWINGS

LEGEND	DESCRIPTION
1 -----	Top plan view of assembled fluorescent light fixture.
2, ----	Ballast channel assembly.
2', ----	Ballast channel bottom.
2'' ----	Ballast channel cover.
3 -----	Fluorescent light tubes.
4 -----	Fluorescent light tube reflectors.
4' -----	Convex side of reflectors.
4'' -----	Light reflector channels/concave side of reflectors.
5 -----	Fluorescent fixture tube sockets.
5' -----	Fluorescent fixture tube sockets, connected in series
6 -----	Socket mount/wire raceway arms.
6' -----	Bottom section of channel socket mount/wire raceway arm.
6'' -----	Top cover section of channel socket mount/wire raceway arm.
7 -----	Electric power source into the light fixture assembly apparatus.
8 -----	Hanger mounts.
9 -----	Screw mounts.
10 -----	Hanger wire/chain.
11 -----	Rim edges on length of fluorescent light reflectors.
12 -----	Fluorescent light fixture frame.

LEGENDS

DESCRIPTION

- 13 ----- Anchor rivets, bolts or screws for
attachment of light reflectors to socket
mount arms.
- 14 ----- Apertures for fasteners attaching reflectors
to socket mount arms.
- 15 ----- Fasteners for attaching top of ballast
channel to ballast channel bottom.
- 16 ----- Wires in arms of fixture frame.
- 17 ----- Aperture slots for insertion of snap fit
fluorescent light tube sockets.
- 18 ----- Slots in reflectors.
- 19 ----- Fasteners to attach reflectors to socket
mount arms.
- 20 ----- Switch on/off.
- 21 ----- Single fluorescent light tube fixture.
- 22 ----- Ballast channel assembly for single
fluorescent light tube
- 22' ----- Ballast channel bottom for single
fluorescent light tube.
- 22'' -- Ballast channel cover for single
fluorescent light tube.
- 23 --- Ballast
- D ----- Diameter of fluorescent light tube. Fig.16
- d ----- Distance between top surface of fluorescent
light tube and arc of reflector. Fig. 16.
- d' --- Distance between edges of reflector. Fig. 16
- C ----- Distance from bottom of fluorescent light
tube to line extending from edge to edge
of reflector. Fig. 16.

LEGENDS

DESCRIPTIONS

R --- Radius of arc of reflector. Fig. 16.
H ---- Height of reflector. Fig. 16
W ---- Distance between edges of reflector.
Fig. 17.
R'---- Radius of arc of reflector. Fig. 17.
Ht --- Height of reflector. Fig. 17.
S ---- Distance from bottom of fluorescent light
tube to line extending from edge to edge
of reflector. Fig. 17.
T --- Distance between top surface of fluorescent
light tube and arc of reflector. Fig. 17
Blue - Individual wires for one end of each fluore-
scent light tube sockets 5.
Red -- One wire from ballast to fluorescent
light tube sockets connected in series 5'

0012- DETAILED DESCRIPTION

The disclosure of this invention includes mounting of a plurality of elongated fluorescent light tubes in a plurality of elongated reflectors, and a ballast mounted in the assembled elongated fluorescent light fixture.

0013- The invention described herein discloses a fluorescent light fixture apparatus having downlight and suspended from the ceiling; and each fluorescent tube light mounted in its own reflector 4 for maximum "down light", and each reflector 4 attached to fluorescent light fixture frame 12. The fluorescent light fixture apparatus may be for direct downlight or semi-direct, in which case there may be slots in the top surface of the reflectors. (see sec. 12, page 169 in "STANDARD HANDBOOK FOR MECHANICAL ENGINEERS" by BAUMEISTER and MARKS (seventh edition))

0014- The fluorescent light fixture 1, top plan view Fig. 1 apparatus of this invention varies from the prior art, in that in this invention, each fluorescent light tube 3, (Figs. 2, 5, 6 and 7) in the fixture assembly 1, (Figs. 6, 7) is mounted in its own light reflector channel 4'' (Figs. 2, 3, & 6) , on the concave side 4'' of the reflector 4 (Fig. 9). The light reflectors 4, are attached to the socket mount/wire raceway arms 6 , by anchor rivets, bolts or screws 13, at each end of the light reflector channels 4''. see Fig. 7. Fluorescent fixture tube shunted sockets 5 are mounted in aperture slots 17, for insertion and snap fit of fluorescent tube sockets 5 on the socket mount/wire raceway arms 6 (Figs. 3, 5, & 6) of assembled fluorescent light fixture apparatus.

0015- Referring now to fluorescent light fixture frame 12

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2 (Fig.8) showing a plan view of a figure H shape, with arms 6
3 extending outward and perpendicular to the ends of ballast
4 channel assembly 2. and in each socket mount/wire raceway arm
5 6, apertures 17 for insertion of snap fit fluorescent fixture
6 tube shunted sockets 5 and 5'. Ballast 23, for the fluore-
7 scent light tubes 3, is mounted in the ballast channel assembly
8 2 and electric power source 7 into light fixture apparatus 1,
9 and a switch 20 for on/off of the power from the power line 7 to
10 the ballast 23 in the ballast channel assembly 2.

11 **0016-** The ballast channel assembly 2, may be likened to a
12 spine, attached to the socket mount/wire raceway arms 6.

13 **0017-** Fig. 7 is a perspective view of assembly components of
14 the fluorescent light fixture of this invention, with the
15 light reflectors 4, attached to the socket mount/wire raceway
16 arms 6 by fasteners 19.

17 **0018-** Fig. 9 shows isolated light reflectors 4 and apertures
18 14 for fasteners to attach reflectors to socket mount arms 6.

19 **0019-** Fig. 13 shows reflectors having slots 18 in reflectors
20 thus the "light" of the fixtures in addition to having the
21 light go downward the light can also go upwards, but in a
22 lesser amount.

23 **0020-** Fig. 14 is a cross-section view of a single
24 fluorescent light fixture, and a single reflector 4, and
25 ballast 23 mounted in ballast mounting channel assembly 22,
26 and showing ballast channel bottom 22' and ballast channel
27 cover 22'' fitting over the ballast channel bottom 22'.

28 **0021-** Fig. 15 is a perspective view of a single fluorescent
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1 light fixture 21, and the ballast 23 mounted in ballast
2 channel assembly 2.

3 **0022-** Cross section view of socket mount/wire raceway arm 6
4 is shown in Fig. 12, and the arms 6 are assembled from bottom
5 section channel of socket mount/wire raceway 6' and top cover
6 channel section of socket mount/wire raceway 6'', fitting
7 together lengthwise and held in position by suitable screws
8 or rivets to provide the socket mount/wire raceway arm 6,
9 and wires 16, in arms 6 of fluorescent light fixture frame
10 12, (see Fig. 8) assembly.

11 **0023-** Referring now to Fig. 10, the wiring schematic is shown
12 and the ballast 23 is shown mounted in ballast channel
13 assembly 2, and as shown in Fig. 11, is an assembly of a
14 ballast channel bottom 2', and a ballast channel cover 2''
15 fitting lengthwise over ballast channel bottom 2' and this
16 assembly held together by conventional screws 15.

17 **0024-** The electric power source 7 into the light fixture
18 apparatus and on/off switch 20 connected to the power source
19 is shown in Figs. 1, 3.

20 **0025-** The Fluorescent light fixture 1, may hang from a ceiling
21 on hanger wire/chain 10 attached to hanger mounts 8, or to
22 screw mounts 9.

23 **0026-** Reference is now made to Fig. 8, fluorescent light fixture
24 frame 12 and the fluorescent light tube reflectors 4, are mounted
25 on the fixture frame 12, as shown in Fig. 7 perspective view of
26 fluorescent light fixture assembly, and the rim edges 11 on each
27 long edge of each reflector 4, and on assembly of the reflectors
28 4 on the light fixture frame 12, the rim edges 11 of the
29 reflectors 4 overlap as shown in Fig. 19 to give added
30 stability or rigidity to the assembled light fixture.

31 Reference is now made to Figs. 16, 17, and 18 showing cross
section of rim edges 11 of elongated reflector edge rims 11.

0027- The following is a description of the cross section geometry of light reflectors 4, to insure maximum light reflection downward from the fluorescent light tubes 3. Referring to Fig. 16, wherein it is shown the fluorescent tube 3, having a diameter D, then the radius R of the bend of the reflector 4 is $D \times 0.875$, and the arc at the bend of the reflector is equal to 120° , and reflector sides are tangent to the radius at the ends of the arc, and these reflector sides extend outward to a dimension d' equal to $3.25 \times D$, between the edges of the reflector 4, and the distance d between the fluorescent light tube 3 and the arc of the bend of the light reflector is $0.375 \times D$. The distance C is equal to $0.5 \times D$.

0028 Reference is now made to Fig. 17, in which the cross section of reflectors 4 is shown, and the parabola shape compared to Fig. 16, is to reduce the dispersion of light out of the sides of the fluorescent light fixture assembly 1. The reflectors 4 of Fig. 17 are described as the fluorescent light tube 3, having a diameter D, then the radius R' of the bend of the reflector 4 is $D \times 0.875$, and the arc at the bend of the reflector is equal to 160° , and the sides of reflector 4, are tangent to the radius at the ends of the arc, and these sides of reflectors 4 extend outward to a dimension W equal to $2 \times D$, between edges of reflector 4 sides. The distance d between the top of fluorescent light tube 3, and the arc of the reflector is equal to $0.375 \times D$.

0029- Note the height of the arc of reflector 4, as shown in Figs. 16 and 17, is 1.8" which is approximate height to indicate possible scale, and may be more or less as desired.

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2 **0030-** The distance S, between the bottom of the fluorescent
3 light tube 3, and the line W between the edges of reflector
4 4, is equal to $0.25 \times D$.

5 **0031-** In all of the above description and formulas, the "X"
6 stands for "multiplication" or "times".

7 **0032-** Comparing Figs. 16 and 17, it is readily seen that
8 shortening "W" as shown in Fig. 17 then will focus light
9 downward with less light then extending out of the sides of
10 the fixture assembly 1, thus this invention discloses a
11 method to control light downward in a fluorescent light
12 fixture.

13 **0033-** The method of focusing downlight of a fluorescent
14 hanging light fixture 1 by reflectors 4 over each
15 fluorescent light tube 3, a reflector 4 extending the
16 length of the fluorescent light tube 4, and the cross
17 section of the reflector 4, is an arc straddling the
18 fluorescent light tube 3 and a space of 0.375 times diameter
19 of the fluorescent light tube 3 from the fluorescent light
20 tube 3 and the arc of the reflector 4 having a radius of
21 0.875 times the diameter of the fluorescent light tube 3
22 and the arc ranging from 120° to 160° and the sides of
23 the reflector 4, tangent at each end of arc range of
24 reflector 4.

25 **0034-** The reflector 4, of this invention may be of
26 polished sheet metal or metal coated plastic, or metal
27 coated glass.
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3 **0035** To further describe the elongated reflectors 4 of this
4 invention, in cross section the shape is a modified inverted
5 **U**, and the two edges of the elongated reflectors are bent
6 outwards to form rim edges 11, on the length of each edge see
7 Figs. 16,17 and 18. The rim edges 11 overlap as shown in
8 Fig. 19 on assembly of the fluorescent light fixture.

9 **0036** The specification and drawings disclose a fixture
10 apparatus having six elongated reflectors, and six elongated
11 fluorescent light tubes but this invention is not limited to
12 that number, and includes any number of elongated reflectors and
13 elongated fluorescent light tubes of from two to a total of
14 eight reflectors and eight fluorescent light tubes and one
15 ballast in the assembly.

16 **0037** Reference is made to Fig. 4, front elevational view of
17 assembled fluorescent light fixture, and Fig. 10 is a plan view
18 of the light fixture and schematic of the wiring from the
19 ballast 23 to the fluorescent light sockets with the single wire
20 Red from the ballast to the sockets 5' connected in series, and
21 a single Blue wire from the ballast 23 to each of the sockets 5.
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